S
CONTROL
Insect
Spruce Budworm
Beaverhead
Lima Control Unit

SPRUCE BUDWORM PROJECT REPORT

LIMA UNIT, 1957

SPRUCE BUDWORM CONTROL PROJECT REPORT

I. ADMINSTRATIVE ASPECTS OF THE CONTROL PROGRAM

1. Lima Control Unit, Beaverhead National Forest.

2. The unit lies in southern Beaverhead County along the main range of the Beaverhead Mountains; The Tendoy Mountains; and one block on the west slope of the Snowy Crest Mountains. The total net acreage treated is 88,910.

3. The insect responsible for the program was the Choristonuera fumiferana. The infested area can be classified as to degree of infestation as follows:

   High - 6% Medium - 44% Low - 50%

4. Duration of the project: First development checks were started June 10. Final mortality checks will be completed August 2. Actual spraying commenced July 7 and was completed July 24.

5. Precontrol Surveys: Comments pertaining to precontrol surveys are included in the Biologist's remarks, a copy of which is attached.

6. Control method employed: Control was affected by aerial spraying of DDT carried in fuel oil at the rate of 1# of DDT per gallon of oil. This was applied at the rate of one gallon per acre. The spray was applied by low flying aircraft (100 to 600 feet).

7. Aircraft used: The aircraft used on the Lima Unit consisted of five TBM and one N3N spray planes. One Cessna 182 and one Cessna 195 were used as observation planes. Comments: The practical uses of the N3N type of aircraft is definitely limited because of low gallonage and slow flying speed. Some thought on the qualifications of this airplane when laying out spray blocks might open the way for more successful use. The TBM appears to be the optimum sized aircraft for areas such as the Lima Unit consisting of scattered timber stands in rough country. They carry sufficient gallonage and have enough speed to bring ferrying time to minimum while retaining sufficient maneuverability to cover the area. The Cessnas were adequate as observation planes. The 182 was favored slightly because of its greater visibility. A great deal of difference was noted in the efficiency of various pilots. Those pilots with previous mountain spraying experience seemed far superior to those lacking in or short of such experience.

8. Spray blocks: The unit was originally divided into twenty-five blocks. Later one block was dropped because of the small degree of infestation coupled with late development. The blocks ranged in size from 2411 acres to 6480 acres. Two blocks ranged in size toward the end of the program because of late development. It is difficult to draw any conclusions as to ratio or

plane size to block size except to state that the N3N type is too small and slow to spray blocks of more than 2500 acres. Insect conditions would become critical and proceed faster than spraying operations under these conditions.

Recommendations: The number and size of spray blocks should be determined by elevation and exposure patterns which affect development rather than according to an arbitrary acreage figure. Some thought should also be given to spray flight problems when laying out blocks.

9. Forest Service Organization: The Control program required a total of 914 man-days broken down into the following groups:

Overhead--218 man-days. This includes the Assistant Unit Supervisor, the Unit Biologist, the Biological Assistant, and the Administrative Assistant.

Airport---188 man-days. This includes airport maintenance men, aerial observer, and base radio operator.

Weather--- 71 man-days. Included two weathermen.

Biological 437 man-days. Worked by thirteen people.

The airport maintenance man on the afternoon and evening shifts could double as standby radio operator during that time.

The utilization of local personnel to as great an extent as possible would be advantageous from the viewpoint of public relations as well as promote greater efficiency. Familiarity with local topography and road conditions is a necessity for certain jobs. In particular, the aerial observer should know the spray area thoroughly.

10. Automotive Transportation: Automotive transportation was provided by the lease of four vehicles from auto dealers in Dillon and the issue of three previously condemned vehicles from Missoula. Also one ranger district vehicle was devoted almost exclusively to the program. The cost on the vehicles was based on 15¢ per mile, the Government paid for gas, oil, and all repairs except those on tires and batteries. There was a $150 guarantee on the leased vehicles. Because of dispersion of records it is impossible to gather a total cost figure for the program.

The leased vehicles consisted of three Plymouth sedans and one pickup truck. The sedans were inadequate for this type of program, because of the poor road conditions. Pickup trucks with greater clearance are much more practical, and at least one four-wheel drive vehicle should be included in each motor pool.

If the sealed bid fails, an attempt should be made to procure lease vehicles on a local basis. It appears that the cost on the leased vehicles is somewhat excessive this year. In the interest of public relations and economy, the leasing of vehicles should be left to the Unit Supervisor who is familiar with local conditions and supply.

The delegation of one man as chief of the motor pool as overseer of general maintenance of vehicles to perform minor repair seems worthwhile. We found that some sort of chart to show clearly the status of each vehicle in regards to the last lubrication and oil change was helpful. A sample of the chart we used is enclosed.

Communications: Communications were usually adequate. Radio contact between spray planes and observation plane was very helpful when we had it. Radio between observation plane and the operations base would also be helpful.

Records and Forms: A large wall chart showing the development in the various blocks, plot by plot, was designed to give a current picture of development. Another graph portrayed the development trend in the various blocks.

The forms for recording the actual spray operations were adequate with the exception of SBW 11, Insecticide Inventory Record. This form should be developed to include figures on daily gallonage dispensed and to give a summary figure of insecticide on hand. A sample revision of the form is enclosed.

A clear-cut policy on the recording of observation plane flights should be made at the start of the program. This was not done this year, and considerable confusion arose in logging the use of the planes by the contractor's personnel.

11. Contractor Ground Organization: Contractor ground personnel at Dell Airport at the beginning of operations consisted of the following:

1 chief pilot	1 helper
1 A & E mechanic	1 in charge of insecticide

They were all competent in the work required of them. However, the force was below contract requirement in number, and the effect of this shortage was noticeable on our operations. Some spraying time was lost when aircraft were grounded due to poor maintenance and minor mechanical trouble. There seemed to be a lack of organization between the contractor and subcontractors as to responsibilities along these lines. More study might be given to the minimum ground force required to fulfill contractual obligations in writing future contracts, and the contract should be strictly adhered to.

There was pressure to start operations this year even though contract requirements as to ground personnel were unsatisfactory. This should be avoided in the future. Once such a precedent is set, it is very difficult to change.

Contractor's representatives should be designated in writing in order to avoid later misunderstanding.

12. Forest Service Field Headquarters: Field headquarters consisted of three tents set over board frames. One tent was used as office and radio hut. Furniture consisted of two desks and several chairs. A telephone was installed and electricity was furnished from a nearby REA line. A small file cabinet would have been an useful addition. One tent was used as a map and briefing room. The other was used as coffee and snack shack. We suggest that in the arrangement of tents in the future, the snack tent be placed closest to the loading area for pilot accomodation.

13. Insecticide Loading and Airplane Layout: Facilities included 22,000 gallons storage for insecticide in two tanks. One pump was driven by a four-cylinder Wisconsin Engine and two metered outlets. One for loading the TBM types and the other for loading the N3N type.

One hundred octane gasoline storage was provided by two tanks and was pumped through a metered outlet.

At the start of operations, no storage was available for 80-87 octane gasoline. After some delay, this was provided by a local gasoline retailer.

All storage tanks leaked. When first filled, the insecticide tanks leaked quite rapidly. This was corrected to some extent, but some leakage continued throughout operations. The 100 octane gasoline tanks also leaked, creating a very sericus fire hazard. No attempt to correct this situation was made by the contractor.

One meter on the insecticide broke down the first day of operations. This was repaired by the contractor, but the meter broke down again two days before spraying was completed. There was no calibration of the meter either time.

It seems that it would be worthwhile to have a standby meter at each airport, especially since it is impossible to load the airplanes without one.

Safety: The program was marred by the crash of a spray plane in which the pilot was killed. A thorough report on this accident has been filed. One other incident occurred on July 9, when a TBM veered off the runway on takeoff and barely cleared a fence at the edge of the field. An investigation by the Assistant Unit Supervisor indicated pilot error as well as the mechanical failure of a strut which stuck. The stuck strut emphasizes the shortage of maintenance personnel on the aircraft. Pilot error was due to lack of experience in the particular type of aircraft.

14. Special Study Projects: No special study projects were carried on at the Lima Unit.

15. Other Pertinent Data: Two days after spraying in the Deadman Lake Area, the biological coordinator discovered evidence of fish poisoning at the lake area. The pilots had been thoroughly briefed on the area and given specific instructions as to spraying in the vicinity of the lake. The biologist in charge also observed the actual spraying job, and he reported adequate precautions were observed by the spray pilots. Evidently some spray material drifted to the lake. Foliage along the lake showed signs of oil spotting. Bud Bollinger discovered thirty-five dead fish along the sides of the lake. The incident was reported, and further investigations are under way.

UNIT BIOLOGISTS REPORT

I. Pre-control Surveys

Infestation Area Boundaries

Pre-control surveys were too limited. With adequate surveys, both on the ground and in the air, area boundries and block boumdaries could be greatly reduced in most cases. Probably a more extensive survey of areas to be sprayed would result not only in better delineation of boundaries, but also in better developement data through better placement of developement plots.

The main weakness of the present pre-control system appears to be too little time spent on determining the exact location and limits of the infestation. It should be recommended that more time be spent in the pre-control phases of the project. Unless it is considered to be an emergency all areas probably should be checked thoroughly during the summer preceding the one when the actual spraying is done.

Mosaics

Mosaics of an area should be available during the pre-control phases of the spray project to allow for better planning.

Pilots' suggestions indicate that the pilot cards would be easier for them to use if the streams and lakes were colored blue and the timber colored green. The blue boundry lines around the timber patches sometimes tend to distort their shapes and make them harder to identify from the air. Sufficient area surrounding the spray block boundaries should be included in the pilot card mosaic to enable the pilot to orient himself.

At least six (6) copies of all individual mosaics should be ordered for any area to be sprayed.

II. Biological Aspects of Program in Relation to Administrative Program

1. Pre-spray insect development checking

   a. Thirty one insect development plots were established within 18 blocks. Wherever possible, two plots with 500 feet elevational differences were establish in the same block. The higher, more inaccesible blocks were checked intermittently.

b. A ½ inch map showing developement plots is attached.

c. The deleopment plots were classified as follows:

(1) Aspect groups -

Exposure	No. of Plots
North	14
Northwest	4
Northeast	3
Southwest	3
Southeast	3
South	4

Most development plots were on the northern exposures in this unit. There was very little timber on the southern exposures except at the higher elevations.

(2) Elevation Groups -

Elevations	No. of Plots
6400-6499	2
6500-6599	4
6600-6699	1
6700-6799	3
6800-6899	2
6900-6999	3
7000-7099	3
7100-7199	5
7200-7299	3
7300-7399	3
7400-7499	1
7500-7550	1

(3) Timber groups - Timber grouping was limited to Douglas Fir only.

2. Technical reports to administrative reports organization.

a. The initial alert was given nine (9) days before the first block release.

b. Two (2) days elapsed from the date of the first block release to the date of the first spraying.

c. The standards set up for block release should be adhered to as closely as practical to permit accurate post-spray evaluation of the methods used. e.g. The developmental stage of a block at the time of release and subsequent spraying in relation to the post-spray ratio of live spruce bud worms to spruce bud worm pupae would

indicate whether the time of release was premature or late.

d. A graph of the type attached to this report is very helpful in giving a readily understandable picture of the developmental trend and the current state of development of the spruce bud worm larvae.

3. Delineation of spray blocks

a. A 500 foot limitation would work out better in some areas; however, areas should be considered specifically in each unit rather than have arbitrary limitations placed on all units.

b. Aspect similarities or differences appeared to be as important or more important as an influence in the development of the spruce bud worm larvae than elevational similarities or differences.

c. Acreage size limitations of blocks should be determined by the capacities of the aircraft which are considered to be the most practical for the particular topography in a certain unit.

d. As indicated in the preceding items, standards or limitations in respect to altitude, aspect, and acreage should be flexible and molded to fit the special features of each particular unit.

4. Delineation of interior spray areas

a. Interior delineation in general worked out very well since lines of demarkation were for the most part between grasslands and timber types.

b. (1) Small clearings should be left within the spray lines. In spray blocks where there are a number of small patches of timber in close proximity, there should be no interior lines of delineation.

(2) Delineation between host and non-host types, without benefit of topographic features, appeared to be practical only where elevational differences were the deciding factor in the difference in type. In such cases the pilot could use his altimeter as a guide.

(3) Pilots stated that drainages were easier to recognize than ridges. Roads also make good area boundaries. In using streams as boundries, care should be exercised in keeping spray away from important streams. Mortality of trout in Deadman Lake indicated that DDT is extremely toxic to fish, even in very small concentrations.

Recommendations

A. The assistant unit biologist proved to be very much of an asset to the spray project organization. His services should be retained through the mortality counts and until completion of the reports.

B. A chart showing the current development stage and a graph showing developmental trend of the spruce bud worm larvae are very helpful in keeping tab on the development phases in various spray blocks. The chart and graph are also insurance against overlooking or missing the release of a spray block when it is ready.
A chart showing current cumulative mileage of the vehicles used allows a constant and close check in respect to proper lubrication and oil changes.

All charts should be mounted in conspicuous places in the office.

C. More time and a larger portion of the finances should be allotted to the precontrol surveys and planning phases of the control projects. This would pay off in less acreage to spray because of more definite boundries and in better control through more concentrated efforts.

D. Since we have very little information on the effect of the spraying on the ecology of the biotic communities involved, it would seem imparative that some studies be set up to determine the long range effect of the spray on other insect species, birds, and mammals.

E. Dioryctria larvae played a large part in defoliation of trees in some sections of the Lima unit(up to 45 per cent in plot No. 108). Because the Dioryctria pupate earlier than the spruce bud worm larvae, the spray date should be advanced in areas where Dioryctria populations are large.

Attached is one copy each of the following:

Sample revision of the Insecticide Inventory record , Oil change and lubrication chart, Instar chart, Instar graph, and a $\frac{1}{2}$" scale map showing spruce bud worm development plot locations, also a set of records on the establishment of development plots.

CONTROL UNIT _____

INSECTICIDE INVENTORY - Record

Date _____

Record of Delivery				Dispensing Record				
Waybill No.	Tanker Seal No.	Delivered to Tanks	Cumulative Total of Deliveries	Gallons on Hand at Beg.	Meter No.	Meter Readings Beginning	Meter Readings End	Used Today	On Hand at Close of Spraying
					1				
					2				
					3				
					4				
							TOTAL USED		

NFA - SBW Form 11
Jan. 1957

Control Unit _____

INSECTICIDE INVENTORY RECORD

Date	Record of Tanker Bulk Deliveries				Dispensing Record		
			Total Gallons		Project cumulative daily meter readings		
	Waybill Number	Tanker Seal Numbers	Delivered to project tanks	Cumulative total of deliveries	Nozzle 1	Nozzle 2	Nozzle 3

Note: Unit Supervisor or his designated administrative assistant will record deliveries as shown on waybills. Cumulative nozzle meter readings should be recorded at the beginning of operations and at the end of each day's work. Difference between metered output and deliveries will provide approximate inventory record.

	June 29	July 1	July 2	July 3	July 4	July 5	July 6	July 7	July 8	July 9
	Miles Trav.	Miles Trav. Accum.	Miles Trav. Accum.	Miles Trav. Accum	Miles Trav. Accum					
	Lub / Oil	Lub / Oil	Lub / Oil	Lub / Oil	Lub / Oil					
Green Dragon (Plymouth)	390 / 390	540 / 540	Lub / 540	30 / 570	91 / 631					
Black Beauty (Plymouth)	104 / 104	— / —								
Blue Brute (Plymouth)	336 / 336									
Red Streak (Chev. Pickup)										
Dodge Pickup #600										
Dodge Pickup #602										
Ford Pickup #958										
Willys Jeep #213										

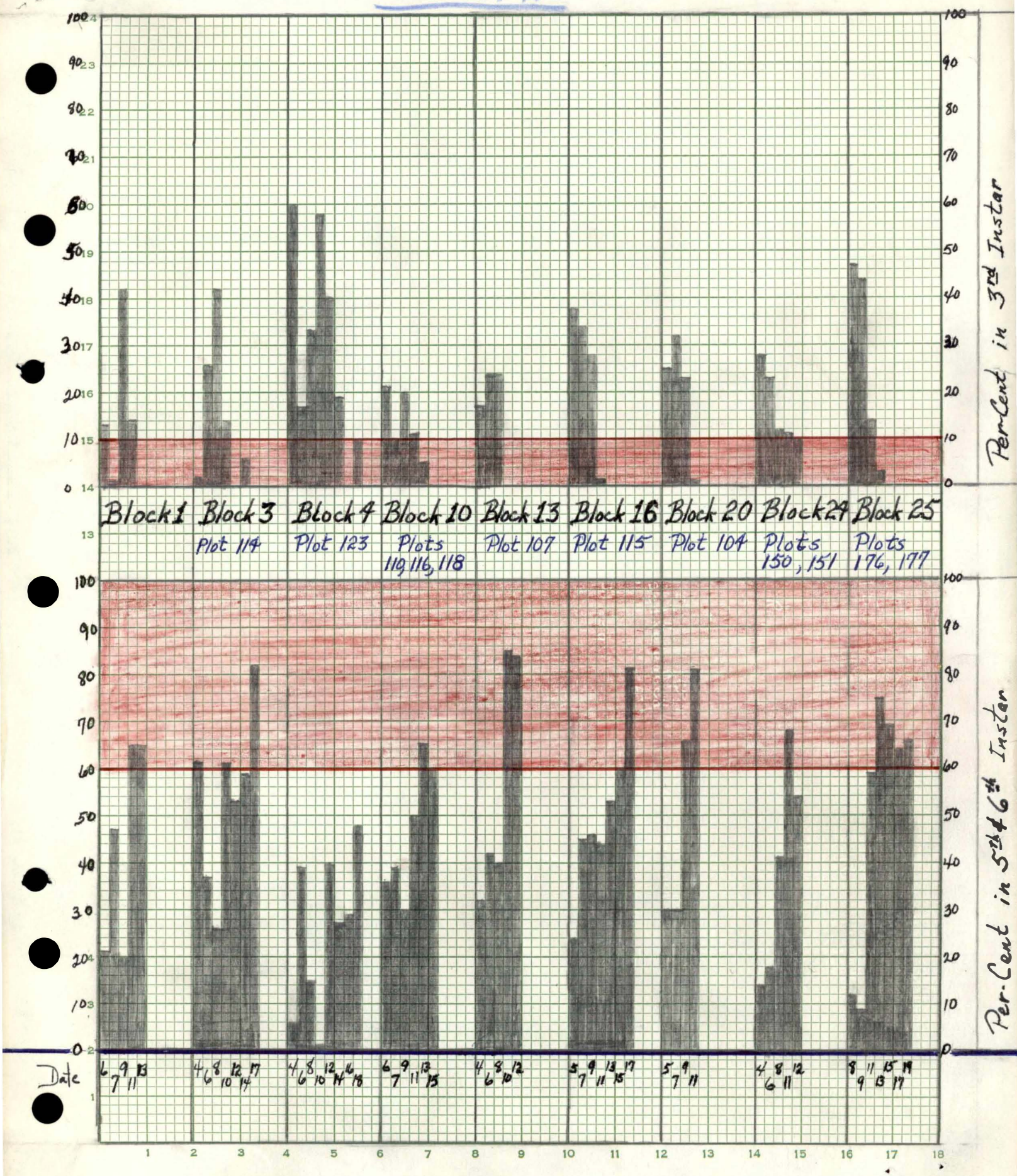
THE FOLLOWING BAR GRAPH DEVELOPED BY HARVEY PELTON WORKS AS FOLLOWS:

There are two rows of bars.
The top row represents the mean per cent of spruce Bud worm larvae in the 3rd instar.
The bottom row represents the mean per cent of the larvae in the 5th and 6th instars.

Each bar in the graph represents the mean per cent of the larvae in a certain instar catagory within a particular block on a specific date.

When a bar in the top row drops into the red zone (10 per cent or less) and the corresponding bar in the bottom row rises into the red zone (60 per cent or more); the block is ready for release.

SAMPLE


Block 1
Block 3
Plot 114
Block 4
Plot 123
Block 10
Plots 119, 116, 118
Block 13
Plot 107
Block 16
Plot 115
Block 20
Plot 104
Block 24
Plots 150, 151
Block 25
Plots 176, 177
Percent in 3rd Instar
Per-Cent in 5th & 6th Instar
Date